

Claims

1. Device for identifying defects in a fuel injection system in which case the fuel injection system includes

- at least one high-pressure pump (10),
- 5 - at least one fuel accumulator (12),
- at least one fuel pressure control valve (14) and
- at least one pressure sensor (16) for recording the pressure prevailing in at least one fuel accumulator (12),
- 10 characterized in that,
- the occurrence of at least one defect in the fuel injection system can be identified by recording a pressure in the fuel accumulator (12) which is too low and
- 15 - a high-frequency component of a first signal characterizing the pressure course in the fuel accumulator (12) over time can be used in order to isolate the source of the defect.

2. Device according to claim 1,

- 20 characterized in that,
- the first signal can be lowpass-filtered so that a lowpass-filtered second signal can be generated,
 - a third signal can be generated as the absolute difference between the first signal and the second signal
 - 25 and
 - the third signal can be compared with a predefined

threshold value in which case, depending on the comparison, the source of the defect can be isolated.

3. Device according to claim 2,
characterized in that,

5 it is possible to conclude that there is a defect in at least one high-pressure pump (10) if the third signal, especially under a high load, essentially exceeds the predefined threshold value.

4. Device according to claim 2 or 3,
10 characterized in that,
it is possible to conclude that there is a defect in at least one fuel pressure control valve (14) if the third signal essentially falls below the predefined threshold value.

5. Device according to one of the preceding claims,
15 characterized in that,

- the pressure determined in at least one fuel accumulator (12) can be evaluated for plausibility on the basis of a value measured by a lambda probe arranged in the exhaust gas flow of an internal combustion engine assigned to a fuel injection pump and
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- it is possible to conclude that there is a defect in at least one pressure sensor (16) if the plausibility check is negative.

6. Device according to one of the preceding claims,
25 characterized in that,

- the pressure determined in at least one fuel accumulator (12) can be compared with a desired pressure or a pressure that is actually present in a low-pressure area of the fuel injection system and

- it is possible to conclude that that there is a defect in the low-pressure area if the pressure determined in at least one fuel accumulator (12) is lower than the desired pressure, or it is possible to conclude that there is a defect in the drive of the high-pressure pump (10) if the pressure determined in at least one fuel accumulator is lower than the pressure that is actually present in the low-pressure area.

7. Device according to one of the preceding claims, characterized in that, at least one electronic control unit allocated to the fuel injection system is provided in which at least one of the said evaluations can take place.

8. Device according to one of the preceding claims, characterized in that, it has an interface so that it can be installed in a motor vehicle.

9. Device according to one of the preceding claims, characterized in that, it has an interface so that it can be installed in a diagnostic unit; said unit being separate from the motor vehicle.

10. Method for identifying defects in a fuel injection system in which case the fuel injection system includes

- at least one high-pressure pump (10),
- at least one fuel accumulator (12),
- at least one fuel pressure control valve (14) and
- at least one pressure sensor (16) for recording the pressure prevailing in at least one fuel accumulator (12),

characterized in that,

the method includes the steps:

- Identifying the occurrence of at least one defect in the
5 fuel injection system by recording a pressure in the fuel
accumulator (12) which is too low and
- using a high-frequency component of a first signal
characterizing the pressure course in the fuel accumulator
(12) over time in order to isolate the source of the
10 defect.

11. Method according to claim 10,
characterized in that,

- the first signal is lowpass-filtered so that a lowpass-
filtered second signal is generated,
- 15 - that a third signal is generated as the absolute
difference between the first signal and the second signal
and
- that the third signal is compared with a predefined
threshold value in which case, depending on the
20 comparison, the source of the defect is isolated.

12. Method according to claim 11,
characterized in that,
it is concluded that there is a defect in at least one high-
pressure pump (10) if the third signal, particularly under a
25 high load, essentially exceeds the predefined threshold value.

13. Method according to claim 11 or 12,
characterized in that,

it is concluded that there is a defect in at least one fuel

pressure control valve (14) if the third signal essentially falls below the predefined threshold value.

14. Method according to one of the claims 10 to 13, characterized in that,

- 5 - the pressure determined in at least one fuel accumulator (12) is evaluated for plausibility on the basis of a value measured by a lambda probe arranged in the exhaust gas flow of an internal combustion engine assigned to a fuel injection pump and
- 10 - it is concluded that there is a defect in at least one pressure sensor (16) if the plausibility check is negative.

15. Method according to one of the preceding claims 10 to 14, characterized in that,

- 15 - the pressure determined in at least one fuel accumulator (12) is compared with a desired pressure or a pressure that is actually present in a low-pressure area of the fuel injection system and
- 20 - it is concluded that there is a defect in the low-pressure area if the pressure determined in at least one fuel accumulator (12) is lower than the desired pressure, or it is concluded that there is a defect in the drive of the high-pressure pump (10) if the pressure determined in at least one fuel accumulator is lower than the pressure
- 25 that is actually present in the low-pressure area.

16. Method according to one of the claims 10 to 15, characterized in that,

at least one electronic control unit allocated to the fuel injection system is provided in which at least one of the said

evaluations takes place.

17. Method according to either one of the claims 15 or 16,
characterized in that,
the comparison of the pressure determined in at least one fuel
5 accumulator (12) with the desired pressure or the pressure that
is actually present in the low-pressure area of the fuel
injection system takes place before using the high-frequency
component of the first signal.

18. Method according to one of the claims 14 to 17,
10 characterized in that,
the plausibility evaluation for determining the functionality
of the pressure sensor (16) is carried out before the pressure
determined in at least one fuel accumulator (12) is compared
with a desired pressure or the pressure that is actually
15 present in a low-pressure area of the fuel injection system.

19. Vehicle with a device for identifying defects in the fuel
injection system according to one of the claims 1 to 7 and in
particular for carrying out a method according to one of the
claims 10 to 18.

20 20. Diagnostic unit with a device for identifying defects in a
fuel injection system of a vehicle; said unit being arranged
separately from the motor vehicle according to one of the
claims 1 to 7 and in particular for carrying out a method
according to one of the claims 10 to 18.